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Review

Plant–plant interactions in tropical alpine environments

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Abstract

Plant–plant interactions are increasingly recognized as a key driver of community organization and ecosystem processes in alpine environments. However, patterns and mechanisms of plant–plant interactions remain largely uncharacterized in tropical alpine ecosystems (TAE) which represent as much as 10% of the total surface area of alpine ecosystems worldwide. In this paper, we review (1) the ecological and environmental features that are specific to TAE in comparison with other alpine ecosystems, (2) the existing literature on plant–plant interactions in TAE, and (3) whether patterns and mechanisms of plant–plant interactions established in extratropical alpine zones can be extended to TAE. TAE are located predominantly in South America, East Africa, and South-East Asia where they show a unique combination of environmental characteristics, such as absence of persisting snow cover, high frequency of diurnal freeze–thaw cycles and needle-ice activity, and a decrease in precipitation with increasing altitude. These environmental characteristics result in the presence of giant growth forms with a great architectural diversity. These biotic and abiotic characteristics influence the outcome of plant–plant interactions by imposing other types of environmental constraints than those found in extratropical alpine environments, and by potentially generating distinctive patterns of niche differentiation/complementarity between species and populations. To generalize the conceptual framework of plant–plant interactions in alpine environments, we advocate that TAE should be investigated more thoroughly by applying designs, methods and hypotheses that are used currently in temperate areas and by conducting studies along large latitudinal gradients that include tropical regions.

Keywords

Community organization; Competition; Facilitation; Niche differentiation; Nurse effect; Stress-gradient hypothesis

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